

Efficient Operation of SCR/SNCR

Stephen B. Mandel, QEP

Spectra Gases Inc. 3434 Rt 22 West, Branchburg, NJ 08876

E-mail: stephenm@spectragases.com; Telephone (908)252-9300; Fax (908) 252-0811

Richard Zuendt

Spectra Gases Inc. 3434 Rt 22 West, Branchburg, NJ 08876

E-mail: richardz@spectragases.com; Telephone (908)252-9300; Fax (908) 252-0811

Summary

The use of SCRs/SNCRs for the reduction of NO_x emissions is growing in the United States spurred by the enactment of the Acid Rain Program in the 1990s and the recently enacted Clean Air Interstate Rules (CAIR) and the CAMR (Clean Air Mercury Rules). CAIR requires the continuing reduction in NO_x emissions for the next several decades, while CAMR which mandates reduction of mercury emissions acknowledges the co-benefits achieved by the use of SCR followed by FGD (flue gas desulfurization). With the value of a NO_x credit being approximately \$3,000/ton and a mercury credit being estimated at \$30,000/pound and the cost of reduction reagents escalating, the efficient operation of the installed SCR/SNCR becomes critically important.

The operation of the SCR/SNCR for NO_x reduction requires the injection of a reducing agent (either ammonia or an ammonia releasing compound such as urea). The reducing agent reacts with the NO_x to produce nitrogen and water thereby reducing the NO_x emissions. Due to the costs associated with the reducing agents efficient operation of an SCR/SNCR requires the injection of the proper amount of these agents to insure the intended reduction in NO_x emissions while not over injecting and potentially increasing what is referred to as "slip". Slip is the amount of un-reacted reagent that ends up in the stack. While some slip is required to insure the level of NO_x reduction too much slip is simply a waste and in some cases based upon permit requirements may even be a violation.

Proper operation of an SCR/SNCR is quite similar to that of any similar process system. Control of reagent feed may be accomplished by feed forward, feed backward, or a combination based upon NO_x levels. In addition, NH₃ may also be monitored and utilized in the control loop. Feed forward control monitors the NO_x level in the flue gas entering the SCR/SNCR to calculate and control the reagent injection rate. Feed backward control monitors the NO_x level in the flue gas leaving the SCR/SNCR to change the reagent injection rate. In the combination feed forward/feed backward the inlet NO_x is used to set a reagent injection rate while the outlet NO_x is used to trim the feed rate.

Depending upon your permit the measurement of the outlet and possibly the inlet and outlet NO_x measurements may be included in your compliance reporting. In addition if you have a permitted level of slip you may also have an NH₃ monitor installed.

All of these analyzers require calibration to insure that they are working properly and also to provide you with accurate data for both routine operation and regulatory compliance. Over the years the US EPA

has conducted numerous audits of Protocol Calibration Standards. The most recent test in 2004 showed that over 30% of the NOx calibration gas supply companies tested failed the audit.

If a plant was utilizing calibration gas that failed the audit they would inadvertently either be emitting more than they were allowed or conversely be emitting less than they were reporting but expending additional reagent. In the first scenario, the potential for having to purchase credits, pay fines, or in the extreme, face incarceration for the Designated Representative. In the second scenario the plant would be spending more than required without a commensurate reward.

This paper will explore the financial ramifications of improper control of SCR/SNCR.